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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XLVII
No. 1206

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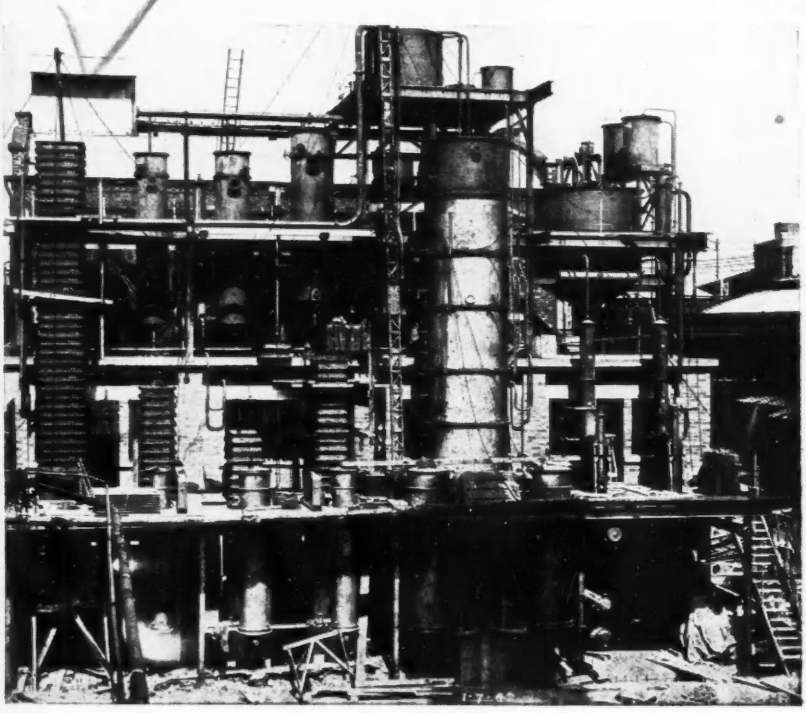

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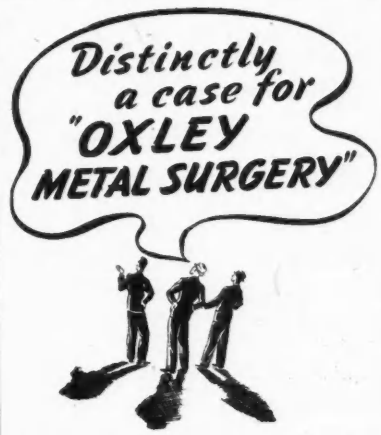

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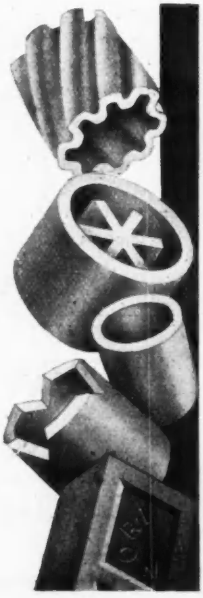

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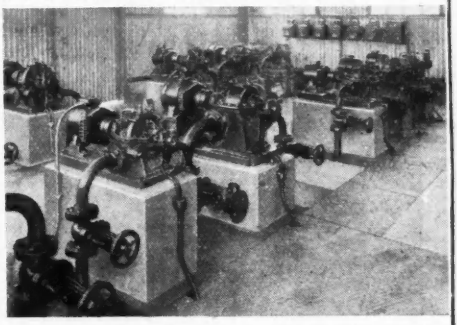

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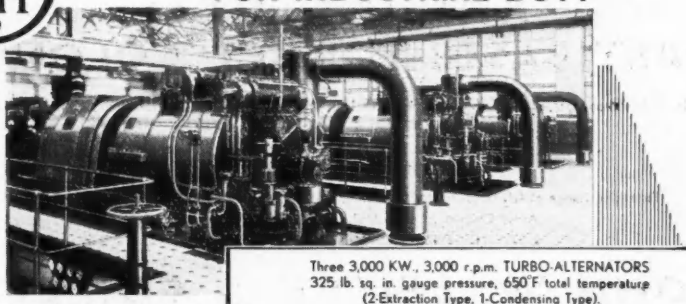

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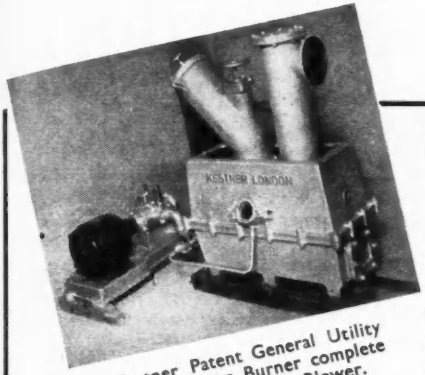

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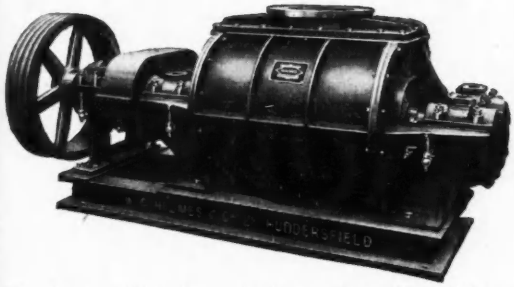

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Practical Co-operation

ATTENTION is drawn, in a recent monthly letter of the Royal Bank of Canada, to a great, but almost unnoticed, experiment in international relations, now in progress between Canada and the United States, which may have profound repercussions in the post-war period. There are at the present time two schools of thought regarding the problems of international post-war reconstruction. On the one hand it is argued that our only immediate task is the winning of the war, and that post-war problems can be settled when they arise. The opponents of this thesis contend that final victory, in the real sense, depends upon the clarification and adoption now of plans for post-war action, to be placed in effect immediately upon conclusion of the armistice. The ideal solution, of course, would be some organisation essential to the winning of the war, yet equally valuable as a basis and instrument for post-war co-operation.

Do not the United States and Canada possess, in fact, the nucleus of just such an organisation, whose wider implications are perhaps not realised? These two countries have set up, for purposes of joint action in the conduct of the war, a number of committees. Some of these, such as the Permanent Joint Board on Defence, the Joint War Production Committee, and the Materials Co-ordinating Committee, have very specialised tasks to perform in somewhat limited fields and their efforts are concentrated on speeding the output of the military and economic weapons of war. The Joint Economic Committee of Canada and the United States, however, operates in the whole field of economic endeavour in the two countries, and here lies a possible nucleus of post-war co-operation.

Since the work of this committee also bears so directly on the war effort of the two countries, few of their plans or recommendations are made public. One example, however, is sufficient to indicate their plan of operation. In April, the United States and Canadian Governments announced their approval of an agreement, based on the recommendations of the Joint Economic Committee, for more effective utilisation of the agricultural resources of Canada and the United States and for a partial solution of the growing problem of securing an adequate supply of oils and fats. By the terms of the agreement, a far-reaching plan of effective integration of resources

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for war has been arranged with the least possible dislocation of existing economic and political relationships. Such an agreement, practical and particularised, affords a much surer base for economic co-operation than could any theoretical programme, premised on broad generalities rather than on the actualities of an individual situation. It is surely not too much to suggest that the extension of such methods in the post-war period is worthy of serious consideration.

Another important feature of the general work of the joint Canadian-American Committees is the opportunity afforded for contacts between the men who actually administer the policies thus instituted. These administrators, faced daily with the multitudinous decisions necessary for the conduct of the war, might tend to concentrate upon the solution of domestic problems, without considering the total effects of their decisions and regulations.

As individuals, as citizens of our own country, we all know how essential is the spirit of compromise, of adjustment, of understanding our neighbours' views. These things are the foundation of community life and of organised society. No civilisation in which Canadians and Americans would wish to share, would be imaginable without them. In the relationships of individuals, the art of civilised living is premised on compromise between differing opinions, and on the acknowledgment if not the acceptance of another's point of view. Among the citizens of a state, they are the essence of democracy. Do they not form the logical basis for the next step in international relations? We know, too, that these adjustments are not attained at social gatherings or state functions. Verbal acceptance of their principles is not enough. They must be applied, often by trial and error, to the minutiæ of daily life, through long periods of working together. The agricultural agreement between Canada and the United States represents the working out of just such details of adjustment in the international sphere.

Like all practical achievements, the results of such co-operation will be somewhere between the unattainable ideal and the existing fact. Close economic co-operation between Canada and the United States has been made necessary by war. The experience can be used for voluntary co-operation in time of peace. Canada and the United States have pioneered in many successful experiments in international relationships. Perhaps they are to-day laying the first foundation stones of a new form of co-operation among the nations, based on the broad application of the principles of mutual tolerance and adjustments in small things as in great.

NOTES AND COMMENTS

Propaganda for Science

TO judge from recent editorial writings in American technical journals, scientists and technologists in the United States have been suffering from the effects of a campaign of belittlement in comparison with their foreign (especially German) counterparts. Assertions and interpretations made in the law courts during various so-called "trust-busting" cases have left the impression, it appears, that the ingenuity of American technologists is negligible; that their country is little more than an excellent market for the products of foreign invention; and that the outbreak of war left them practically without resource in the scientific struggle. In a way, of course, the fault lies with the scientists themselves; they have been too absorbed in their work to educate the general public in the progress that has been made therein. We have heard similar and equally justifiable complaints here; but we have at all events started to apply the remedy, and it is good to learn that American science, too, is now awake to the need for a little educative publicity. The propaganda branch of science must no longer be an enemy monopoly; as we have repeatedly urged, men of science must make themselves and their doings better known to the man in the street.

Fuel Economy

ARISING out of the conference on fuel economy in Royal Ordance Factories, reported in our last week's issue, a number of suggestions have been made, which show that the authorities are seriously interested in this question, and which might well be adopted in other factories and plant. The "pull-

ing " power of graphic posters, as recommended by the N.S.P.A. and other bodies, is evidently recognised, as a proposal to exhibit posters setting out the waste of coal in pounds per week from dripping taps, neglected lights, etc., has already been passed. Other suggestions for cutting out waste and increasing efficiency included the training of women to act as overseers of certain aspects of fuel economy, and an approach to Works Production Committees, with the request that they use their influence to secure the proper use of fuel. It is stated that the Royal Ordnance Factories have formed a small body of experts who are now visiting individual factories and seeing that every possible means of fuel economy is practised; the savings thereby effected are already appreciable and further substantial results are expected. There is no recommendation here which is beyond the reach of other factories, and some or all of the proposals made might well be taken up unofficially. Creditable though the performance of the chemical industries undoubtedly is, he is a bold manufacturer who can lay his hand on his heart and swear that no electric light, or no gas burner, is ever left to burn unnecessarily in his factory.

Real Collaboration

ANOTHER voice has been added to the call for post-war collaboration between Britain and the United States. Sir William Jowitt, Paymaster-General and Minister in charge of reconstruction studies, has declared that this form of co-operation should be to the benefit of all the United Nations. He meant, no doubt, that the form in which we fashion this collaboration should ensure beneficial results for all the peace-loving peoples of the world. Sir William went on to enumerate the tasks with which we should be faced, pointing out the prospect of a heavy deficit on foreign trade immediately after the war. The two points seem to us to be linked closely together. Collaboration, if it is to have any lasting influence on the conduct of world affairs, must provide for an exchange of trade. It must be remembered, too, that in the interval between the end of the war and the re-establishment of world trade, we shall still have the benefit of the close attention we have paid to increasing our self-sufficiency. This has been an expensive process and is without defence as a permanent feature of British policy, but it will help us to tide over what will undoubtedly be a difficult period.

How German Industry Prepared

ALL but the most credulous are now fully persuaded that the Germans had their minds set on a war, which would bring to them world conquest, for many years before the Hitler régime. In a recent book by Bernhard Menneon *German Industry on the Warpath*, 1860-1939 (Hutchinson, 1s.), the author traces a close association between German industry and the General Staff back to the time when, in 1919, the Inter-Allied Military Commission was said to have discovered a camouflaged German " Economic Staff " at work. Under different names this secret economic organisation for war went on, despite of discovery. As far back as the middle 1920's the " ersatz " industries began to make their appearance and, although high costs were involved in their development, nothing was allowed to hinder this German insurance against shortage of vital materials when war finally came. The buildings for apparently normal industrial production were often built far more solidly than appeared necessary, the lathes were too big for their tasks, and the machine tools far too numerous. This development, says the author, was not confined to Germany's former armament works proper, although these were maintained and even expanded.

Large Subsidies

WORKS which could not run on a profitable basis in the ordinary course of business, but whose production was important for war purposes, were subsidised. These subsidies ran into hundreds of millions of marks. Among the important raw material suppliers who received these grants between 1926 and 1930 was the Bergwerksgesellschaft Giesches Erben (zinc) which was allowed 25 million marks, while in the semi-agricultural section of industry, developed to ensure food supplies, Stickstoffsyndikat (nitrogen for fertilisers) received 20 million marks, Kalisyndikat (potash) 10 million marks, and potato and starch production concerns 7.5 million marks. Industrial giants such as Krupp, Siemens, and Thyssen were "supported" on a proportionate scale to the extent of hundreds of millions of marks.

A CHEMIST'S BOOKSHELF

INSECT PESTS IN STORED PRODUCTS. By H. Hayhurst, F.I.C., A.M.I.Chem.E. Photographs by Harry Britten. 2nd Ed. London: Chapman and Hall. Pp. 108. 15s.

This admirable little book well deserves the issue of a second edition after only two years. Since it was originally reviewed in these columns, some useful additions have been made, notably a full bibliography and a chapter on the *Siphonaptera* (fleas), as well as a note on the beneficial and common "false scorpion," *Chernes panzeri*, which, though depicted, was unaccountably left undescribed in the original edition. References to the illustrations (say in black numerals) might well be added in the index, and the new chapter might be more carefully read for "literals" before the next edition is printed.

THE ADVANCEMENT OF SCIENCE, Vol. II, No. 6. London: British Association. Pp. 64. 5s.

The main contents of the present volume are the reports of the Transactions of a Conference on European Agriculture, held in London on March 20-21. It will be remembered that the conference was postponed for a week on account of the death of Sir William Bragg. The report records addresses by an assembly of experts on agriculture, their words, not unnaturally, being directed almost entirely towards the problems of post-war reconstruction. It is to be hoped that their recommendations may be put into effect on a truly international basis. Two other short papers are included in the present volume: one, on the International Research Council, by Sir Henry Lyons, which is particularly apposite in view of the existing movement towards international collaboration in science; the other, by Sir Richard Gregory, called "Science in Britain," outlines the peacetime activities of the Association, and is of interest to those who have only come into contact with it since the war.

STEELS FOR THE USER. By R. T. Rolfe, F.I.C. London: Chapman & Hall. Pp. 356. 25s.

In the present second edition, revised and enlarged, the author brings his subject up to date. There are already many books on steel, from students' general textbooks to specialist books on the various branches of steel production; these are usually written by scientists, who are not so conversant with industrial requirements. This book, therefore, written by the chief metallurgist of Messrs. W. H. Allen, Sons and Co., Ltd., Bedford, presents the experience of a user for the benefit of the user. It deals comprehensively with carbon steels in tasks not satisfactorily performed by alloy steels. The treatment is in fact a practical one and, as the various points are illustrated by ample data and samples as well as with 116 figures and many tables, it brings practical experience into contact with theoretical science.

The new chapters (x-xii) which appear for the first time deal with fatigue testing, weld testing and treatment, and with the general principles of selection. A comprehensive index and many references to the literature are an additional guide for the reader. Altogether the book will be generally welcomed by users of steels, largely because it is a record of work done on practical industrial lines and in practical fields. The work will be recognised as a necessary item in the industrial use of steels as it bridges the gap between science and practice for carbon steels in industry, and may be unreservedly commended to all engaged in this sphere.

New German Materials

Corrosion-Resistant Apparatus

CHILLED castings of 65-70 per cent. ferro-silicon have been used in the I. G. Farbenindustrie works at Höchst as a corrosion-resisting material, especially in large boilers with up to 6 cu. m. volume. They withstand all acids with the exception of hydro-fluoric but do not protect against strong alkalis. Pressure resistance is 4,000 kg./sq. cm., tensile strength between 60 and 100 kg./sq. cm., heat conductivity 40 kcal./m.hr.°C., expansion at rising temperatures is half that of steel, and modulus of elasticity five times greater than that of steel. Ferro-silicon plates welded to steel are soldered without tin, and joints are protected with a special acid-resisting putty. This treatment is said to be equal in value to enamel in many respects and superior to it in that it can be applied to large vessels, imparts greater mechanical strength, and can be easily repaired. No serious complaints, it is claimed, were reported in operation over two years.

Less than 6 oz. of chromium per sq.m. are said to be required to confer corrosion resistance on pipes and other metal surfaces by the so-called BDC-Inkrom process, said to be used on a large scale in Germany for the protection of steels which contain no protective alloy metals but are specially selected for the process. Volatile chromium compounds are made to react with the surface of the article which is to be protected at a temperature of about 1000° C. either directly or in a salt melt or by means of ceramic products in which they are stored. The chrome content of the protected steel amounts to 35 per cent. on the surface and declines at a regular rate inwards. Corrosion resistance is, down to a depth of 1/25 in., equal to a high-percentage chromium steel, it is reported.

Fuel Economy in Boiler Operation, III

Details of Control Systems

by D. D. HOWAT, B.Sc., Ph.D., A.I.C., A.Inst.M.M.

(*Continued from* THE CHEMICAL AGE, *August 1, p. 102*)

IN the hydraulic controller incorporating the differential piston amplifier, oil, under pressure, is admitted freely to the top of the piston, but through a restricting orifice to the bottom (Fig. 4). The top area of the piston is only half that of the bottom, so that the piston will be in equilibrium only when the pressure of the oil beneath the piston is exactly half that on the top. Also connected to the oil space underneath the piston is the bleed valve with exactly the same area as the restricting orifice when in the balanced position and controlled by the weigh beam. A double lever, pivoted on the amplifier piston, operates the pilot valve by which oil under pressure is admitted above or below the power piston. A return-motion linkage from the power piston is attached to this double lever, the arrangement operating as a rigid return device. By this means the power piston is made to repeat on a larger scale all the movements of the amplifier, the displacement of the power piston depending on the ratio of the arms of the return-motion lever.

The Electroflo Weigh Beam

When the weigh beam is balanced, the bleed valve is in the mean position and the power piston will remain fixed. If the air-loading pressure varies, the movement of the weigh beam alters the position of the bleed valve. A difference in pressure occurs above or below the amplifying piston, which in turn operates the pilot valve admitting oil under pressure to one side or other of the power piston. The displacement of the weigh beam is controlled and corrected by the stabilising oil dashpot. The stabilising cylinder is carried on top of the amplifier piston while the plunger is attached to the weigh beam. Oil flows from one end to the other of the stabiliser through an adjustable orifice. Should the weigh beam deflect owing to the setting in motion of the amplifier by an alteration in the control valve, a counteracting force is applied by the dashpot, tending to restore the weigh beam to the mean position. The retarding force on the weigh beam, proportional to the rate of change of the deviation, steadily slows down the speed of movement of the amplifier as the control point is reached, thus preventing overshooting. By this yielding return system, it is claimed, corrections may be applied at rates dependent on the magnitude of the deviation and on the rate of change.

In a pneumatic controller, the piston amplifier is replaced by a spring-loaded diaphragm with an attached rod actuating the pilot valve. Air under pressure enters the chamber beneath the amplifier diaphragm and is allowed to leak away through a bleed valve, the opening of which is determined by the position of a rod attached to the weigh beam. The movement of the diaphragm and therefore of the pilot valve is determined by the bleed valve. The operation of the power piston follows exactly the movements of the amplifier.

Variable Control Attachments

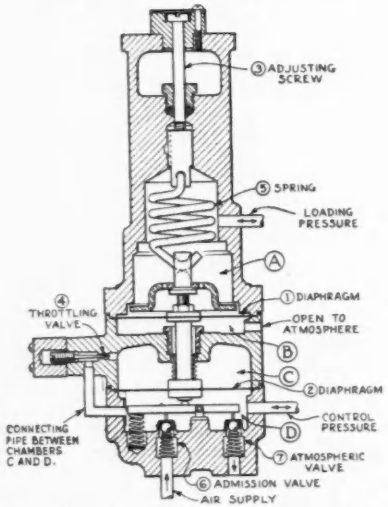
A feature of the Electroflo system is the optional provision of maximum and minimum rating control. These attachments fix the range of load which will be accepted by any boiler or group of boilers in any operating circumstances. Handwheels mounted on the boiler-control panel enable the controls to be set to chosen limits. The advantage of the minimum control in boilers fired with pulverised fuel, gas and oil is that the supply to the burners will not be cut below the minimum value for safe operation. Where sudden load changes are a common feature of steam demand, the maximum control ensures that the operation of the boiler will remain within the upper limit of efficient operation.

Furnace draught control is effected by an auxiliary controller of exactly the same type as those previously described. The negative pressure at a suitably chosen point in the combustion chamber is applied to the under side of the measuring diaphragm and opposed by an adjustable spring. Movement of the diaphragm is transmitted through a balanced beam to the power piston which operates the

damper, vane ring, or brush gear on the forced-draught fan.

Bailey System of Control

The Bailey system employs compressed air both as the medium for transmitting loading pressures from the controllers to the regulators and for the operation of the power piston. An air supply at 35 lb./sq. in. pressure is fed to the pilot valves, which set up the correct loading pressures in the transmission lines or control the admission of air to the power piston. Where several boilers are in operation, a master pressure controller with a master air-pilot valve is employed in conjunction with a "Standatrol" relay. The steam pressure in the main header is measured in the master controller by a pressure helix or Bourdon tube connected



[By courtesy of Bailey Meters and Controls, Ltd.

Fig. 6. Cross-section of "Standatrol" as used in the Bailey meter control system

directly to the master air-pilot valve, a subsidiary pressure standard adjuster being fitted to the helix. The air-pilot valves employed in the system may be either of double-acting or single-acting type, consisting of a steel casing down the centre of which is a stem carrying two steel balls. Compressed air is admitted to the space between the two balls, which control the flow of air from the interior of sleeves surrounding the stem. Annular outlets at the top and bottom connect with the ports leading to the top and bottom of the power cylinder. When the stem shifts up or down in the valve casing, one or other of the outlets is closed and air under pressure is admitted either above or below the piston in the power cylinder, while air is exhausted from the opposite side through the other port. For use with the master controller and the steam-flow/air-flow controllers a single-acting pilot valve is required. This modification is obtained by plugging one valve outlet. Under these conditions each position of the pilot valve stem sets up in the outlet port a definite pressure which may vary from 5 to 25 lb./sq. in. over the full range of movement.

Design of the "Standatrol"

The "Standatrol," patented by the Bailey Meter Co., Ltd., may be employed for standardising, for preventing "hunting," or as an averaging relay (Fig. 6). Housed within a steel casing, the device consists of two pairs of chambers, the lower pair being sealed from the upper by a metal bellows. The air-loading pressure is applied to the uppermost chamber (A) separated by a diaphragm from the second chamber (B) which is open to atmosphere. In the lowest chamber (D) are two spring-loaded ball valves, one connected to the air supply at 35 lb./sq. in. and the other to atmosphere, this bottom chamber being separated from the one above it (C) by a second diaphragm.

When the device is used as a standardising control, chambers C and D are connected by a pipe through a throttling valve, but when the instrument is used as an averaging relay they remain disconnected. The final control pressure applied to the power piston or control device is in the bottom chamber, the actual pressure developed depending on the relative positions of the two spring-loaded ball valves. The two diaphragms are attached to the centre post, hung by a spring from an adjusting screw. The lower end of the centre post actuates a weigh beam, spring-loaded at one end and pivoted midway between the two ball valves. When the air pressure in the top chamber rises, following an alteration in the master air-pilot valve, the centre post is forced down, increasing the pressure in chamber D and opening the compressed-air supply valve. The control

pressure increases as compressed air enters. Simultaneously, when the device is employed as a standardising control, air pressure bleeds through the throttling valve connecting chambers C and D. This increases the pressure on the lower diaphragm with an increased downward movement of the centre post. A rapid rise to a maximum then occurs to the control-pressure line, so that quick movement of the power piston, valve, or actuating diaphragm takes place, until the increased load in the top chamber is balanced. A reverse action occurs when the loading pressure in the top chamber decreases.

The tension on the spring attached to the centre post is adjusted to balance the force exerted on the diaphragm by the normal pressure in the loading chamber. Deviations from this pre-set pressure are corrected and controlled by the movements of the diaphragms and centre post, which operate on the two ball valves, leading either to an increase or decrease in the control-pressure line. The throttling valve is adjusted to harmonise with the response of the process, so that standard conditions are maintained without overtravel or "hunting" of the mechanism.

When the device is used as an averaging relay, chambers C and D are not connected. The main loading pressure, taking precedence in the operation, is fed to the chamber A, while the secondary loading pressure is admitted to chamber C through a throttling valve. The final pressure set up in the control line from the relay is thus the algebraic sum of the main and secondary loading pressures.

Steam Flow/Air Flow Relation

The second important feature in the Bailey automatic control system is the steam flow/air flow relation, which is claimed to be the simplest and most practical means of maintaining continuously the correct percentage of total air in relation to steam demand. Even with a wide variety of fuels of different calorific values, the amount of air required to produce 10,000 B.Th.U. remains approximately constant at 7.5 lb. Or, assuming an adequate supply of fuel, a certain evaporation per lb. of air supplied should be obtained. The Bailey Boiler Meter, comprising both a steam-flow recorder and an air-flow recorder will control and regulate this relationship.

Steam flow is measured by the difference in pressure across an orific plate or a steel flow nozzle in the boiler outlet line. The recorder consists of a mercury-sealed Ledoux bell, the pressure on the inlet side of the orifice being connected to the interior and the lower pressure on the outlet side to the exterior of the bell. The vertical movements of the bell are determined by the differences in pressure, which in turn are proportional to the square of the velocity of the steam flow. By means of a forked lever and spindle the vertical movement of the bell is transformed to a rotary movement which operates the recording pen on the chart.

Action of the Displacer

Air flow is also measured by differences in pressure, two points being selected in the second and third passes of the boiler respectively. The pressures existing across the orifice are connected to the recorder, which consists of two oil-sealed bells suspended from opposite ends of a pivoted beam. A mercury-sealed displacer is also suspended from one end of the beam. The pressure at one or other of the tapped points is led to the centre by a vertical pipe terminating within the bell near the top. The pressure difference moves the displacer vertically to a point at which its change in buoyancy exactly balances the force produced by the pressure difference on the bells. The displacer is so shaped that the pressure difference is converted into a straight line function of the rate of flow. The movement of the pivoted beam is transmitted through a drive link to the recording pen.

After extensive boiler tests, by which the correct amount of total air required has been determined, the air-flow pen is co-ordinated with the steam-flow pen by a special adjustment to operate together on the chart. The two pens will therefore remain together so long as the correct percentage of total air is obtained at all boiler ratings. Divergence of the two pens means that too much or too little air is being supplied in relation to the evaporation in the boiler. By a suitable linkage the two pens may be made to actuate an air-pilot valve of the single-acting type, each position of the valve spindle giving a definite loading pressure in the outlet tube to the control piston or relay. If the movements of the air and steam pens do not coincide, the valve

spindle moves and the outlet control pressure changes until combustion conditions return to the correct value. (*See* Fig. 1).

Application to Various Types of Boiler

With stoker-fired boilers a more immediate response is obtained by changes in the amount of air supplied for combustion than by changes in the rate of fuel input. The master controller is therefore used to vary the air supply in relation to steam demands, while the steam-flow/air-flow relation is employed to control the stoker speed. Variations in steam pressure in the main header are measured by the master steam controller and translated, by the air-pilot valve, into equivalent pneumatic pressures for transmission to the regulators. The air-loading pressure passes through various selector valves to the control drive operating the damper or induced-draught mechanism on each individual boiler. The induced-draught control drive consists of a small metal bellows which moves a relay pilot valve admitting compressed air to one side or other of the power piston. The relay pilot valve is returned to the neutral position by a spring and yoke attached to the power cylinder rod, overtravel of the control drive being prevented by this means.

The fuel supply is controlled by the steam-flow/air flow relation. The two recording pens are linked together with the air-pilot valve in such a fashion that for every position in which the two pens are coincident the pilot valve will transmit to the stoker control drive a definite pressure establishing optimum stoker speed. When the pens are not coincident the pilot valve repositions itself, altering the stoker speed until optimum combustion conditions again obtain. The usual control circuit operates through a control drive of the metal bellows type, which actuates a relay pilot valve admitting air to one side or other of the power cylinder. In the usual arrangement, the movements of the power cylinder operate the rheostat controlling the speed of the D.C. stoker motor.

The rate of evaporation in boilers fired with pulverised fuel, oil, or gas is dependent mainly on the rate of fuel input. A simultaneous change in the air supply should be effected to maintain the best combustion conditions. The principle of control in such boilers is to vary the rate of fuel input and primary air supply with changes in steam pressure, subsidiary adjustments being effected in the secondary air supply by the steam-flow/air-flow relation. As usual, the master control system comprises a Bourdon tube or pressure helix connected to the main steam header and operating a master air-pilot valve. The fluctuations in pressure from the steam header are transmitted by the pilot valve through the Standatrol to the individual boiler control panels.

Pressure Operation

The air-loading pressure is split into two paths at the boiler panel. One leg of the pressure supply operates (through a metal bellows control) a relay valve connected to the power piston. Primary air and fuel supply are varied by the position of a damper actuated by a power piston. The other leg of the pressure supply is led to an averaging relay, where the steam-loading pressure is modified by the changes in pressure set up by the steam-flow/air-flow meter. The induced draught is varied in accordance with the final pressure from the averaging relay. The variations in air pressure from the averaging relay pass through a metal bellows to the power piston controlling the induced draught mechanism.

Where a forced-draught fan has been fitted, the pressure near the top of the furnace should correspond with "level gauge" (the balance of the forced and induced draughts). In such conditions the furnace draught is most easily controlled by the forced-draught damper. A tapping is made near the top of the furnace and the pressure is transmitted to the diaphragm-type control valve. A diaphragm, the movement of which is controlled by a cantilever spring, operates in conjunction with a double-acting air-pilot valve. Compressed air is admitted to one side or other of the power piston controlling the position of the forced draught damper.

(*To be concluded.*)

Heat-resistant steels for American industry have been scaled down to a war-time basis by the Director of Industry Operations in order to conserve two critical alloy materials, nickel and chromium. A new order sets up maximum specifications for heat-resistant alloys used in metallurgical furnaces, oil refineries, synthetic-rubber plants, cement-mill furnaces, and power-plant equipment.

Platinum in the Chemical Industry

Resistance to Acids and High Temperatures

by H. SEYMOUR

IT would be difficult to over-estimate the importance of platinum to the chemical industries, and while, in a few cases, substitutes have been found which are satisfactory within certain narrow limits for special purposes, the demand for platinum to meet the many requirements for which no cheaper substitute can be used is steadily increasing. The ability to withstand acids and high temperatures makes platinum the most desirable material for carrying on many chemical reactions and for general analysis. The use of platinum in chemical equipment need not be confined to very minute parts. It is quite feasible to make large vessels, tubing, and so on, of the precious metal. The initial cost is naturally higher than if base metal alloys are used, but it should not be forgotten that the re-sale value of platinum is very high. Practically any shape can be fabricated, necessary repairs can be easily made, and there is the assurance that the vessel will have a long and healthy life. In addition to chemical equipment, platinum is used in great quantities as a catalyst, particularly in the production of fixed nitrogen from the air and in the sulphuric acid contact process; but in many other processes also it has the property of promoting chemical reactions between substances without undergoing any change itself.

Alloys for Commercial Use

The platinum of commerce always contains a small percentage of iridium which hardens the pure, soft platinum considerably. Alloys containing up to 30 per cent. iridium are used when greater hardness is desired in addition to the non-oxidisable properties; as for example, in contacts for magnetos used in gas-engine ignition, hypodermic needles, etc. For sparking-plug points this alloy is also desirable, but a special alloy of some of the rarer and less fusible metals of the group is preferred. Platinum is also used for anticathodes in X-ray tubes and for lightning-rod tips. The very best thermocouple as yet discovered is the Le Chatelier platinum/platinum-rhodium couple, where one of the wires is of the purest platinum and the other of a chemically pure alloy of ninety parts platinum and ten parts of rhodium. Another very important application in pyrometry is in the resistance thermometer where the temperature is measured by the change of electrical resistance. For this the unalterability and uniformity of pure platinum are absolutely necessary. Substances in general increase in size with increasing temperature, and the coefficient of expansion of platinum is so very close to that of ordinary glass that it is much used for sealing in wires through the glass walls of vacuum tubes for carrying electric currents, etc., into the apparatus.

Laboratory Ware

Lately there has been some controversy over the serviceability of platinum laboratory ware, and an interesting discussion took place recently on this subject at the American Chemical Society, in which Dr. E. Wichers, of the U.S. Bureau of Standards, and an authority on the platinum metals, gave his views. According to this authority, two types of platinum alloy are being used for laboratory ware at the present time in the United States. One type, known as standard crucible platinum, contains 0.2 to 0.4 per cent. of iridium. The other contains three to four per cent. of rhodium. Since the introduction of the latter type, only a few years ago, the Bureau of Standards has made observations on its performance in service as compared with the older "crucible" platinum. So far no striking differences in quality have been observed. They are about equally constant in weight during prolonged ignition. The platinum-rhodium alloy has a distinct advantage in its greater robustness. On the other hand, its tendency to stain or discolour under some conditions of use meets with some disfavour. As yet there is no evidence as to the probable relative life of the two alloys.

The standard "crucible" alloy was adopted by manufacturers some twenty years ago after an investigation at the Bureau had disclosed that the amount of iridium then used in ware (up to four per cent.) caused excessive losses in weight when the ware was heated at temperatures above 1000° C. More recent observations have indicated, however, that the iridium content need not be restricted quite so severely. Crucibles containing 0.75 per cent. of iridium are much more robust than those containing 0.2 to 0.4 per cent. (if the weight and design are the same) and do not lose weight rapidly enough, even with free access of air, to cause significant errors in many operations of quantitative analysis. When such crucibles were heated in the flames of Meker-type burners, the loss in weight was almost exactly the same as that of the other two types (about 0.2 mg. per 25 ml. crucible in four hours at 1100° C.). This difference in behaviour is due to the virtual exclusion of oxygen from contact with the platinum. The change in weight of platinum crucibles varies so much with the conditions of heating, as well as with

the composition of the ware, that the only safe procedure to follow in work of high accuracy is to determine the changes which actually occur under the conditions of the experimental work. If one or two empty crucibles of the same type of ware are carried through the entire experimental procedure and used as tares during weighing, the necessary corrections are automatically made.

For dishes and other ware which is not heated to high temperatures for long periods, advantage may well be taken of the hardening effect of larger amounts of iridium. Two per cent. of iridium is suggested for small dishes (up to 150 ml.) and five per cent. for larger ones. Fabrication of crucibles in such a way that both the bottom and the rim are thicker than the intermediate portion of the wall adds materially to the rigidity and strength of the ware. No evidence has been obtained thus far on the relative merits of different processes of fabrication. Service records show that the simple process of spinning is not objectionable. If crucibles escape damage by contamination with foreign substances during use, they will eventually go out of service because of the development of inter-crystalline cracks. This embrittlement which comes with age is the only remaining serious fault of platinum ware. There is as yet no satisfactory explanation for the development of these cracks. A possible cause is the accumulation of impurities at grain boundaries, either as the result of slow and continuous contamination from gas flames or other outside sources, or of the gradual diffusion of small amounts of impurities which are originally present in the platinum. Sudden failure of a crucible in service is almost sure to be the result of some error or accident in the use of the ware, rather than a fault in its manufacture.

Limitations of Platinum

There are, of course, limitations to the use of platinum in the laboratory and elsewhere in chemical works. For example, it is important to remember that, although platinum is not oxidised in the air at any temperature, nor attacked by any single acid, yet there are many substances that attack and combine with it at comparatively low temperature. The caustic alkalis, the alkaline earths, nitrates and cyanides, and especially the hydroxides of barium and lithium, attack platinum at a red heat, although the alkaline carbonates have no effect at the highest temperatures. Phosphorus and arsenic attack platinum when heated with it; therefore phosphates, arsenates, and so on, should not be ignited in their filter paper in the crucible. Silicon, which may be formed by the reducing action of carbon on silica, causes brittleness. Contact with compounds of easily reducible metals like lead is dangerous at high temperatures, because low-fusing platinum alloys are readily formed. Platinum should never be placed in the inner cone of the Bunsen flame; the carbon in this cone reacts with the platinum to form a carbide which causes brittleness and general deterioration.

Cleansing Methods

Naturally, to every good chemist cleanliness runs neck and neck with godliness. The habit of cleaning and polishing platinum ware immediately after using is easily formed, and repays the user with increased confidence in his work as well as with the prolonged life of the article. The loosening effect of the Bunsen flame upon the surface of platinum exposed to its action produces the familiar grey appearance which cannot be removed except by burnishing. Rubbing the surface of platinum with moist sea sand (round grains only), applied with the finger, serves to remove most impurities and to polish the metal, without material loss in weight. Fusing bisulphate of potash or borax in the vessel and then boiling in water and polishing as above with sand is recommended by one authority. When it is desired to clean the outer surface of vessels in this manner, they must be placed in dishes of sufficient size to allow the fused flux to envelope completely the article to be cleaned. Sodium amalgam possesses the property of wetting platinum without amalgamating with it, even when other metals are purposely added to the amalgam. This substance is, therefore, useful for effecting a quick and thorough cleansing of platinum. The amalgam is gently rubbed upon the metal with a cloth and then moistened with water, which oxidises the sodium and leaves the mercury free to alloy with foreign metals. The mercury is then wiped off and the article cleaned and polished with sand, as above described. If the existence of a base metal alloyed with the platinum is suspected, the article in question should be immersed first in boiling hydrochloric acid for a few minutes; then, after thoroughly rinsing with clean water, in boiling nitric acid free from chlorine. If the article is unaffected in weight or appearance, and the acid baths fail to give reaction for base metals, the absence of these is assured.

United States importers of English cresylic acid have been informed by the Price Administrator that a regulation governing the price at which they may resell this product will be announced in the near future, states *Foreign Commerce Weekly*. The contemplated maximum prices for sales of imported cresylic acid will be based on a price of 4s. 2d. per imperial gallon (70 cents per U.S. gallon) f.o.b. English works, approximately the English domestic price.

Modern Soapmaking*

Processes Used in a Big U.S. Factory

SOAP manufacturing operations really start with the raw materials and in the Manhatton Soap Co.'s factory in America the purifying and bleaching treatments are stressed in order to assure highly refined products. Tallow and coconut oil are stored out of doors in large steel tanks equipped with steam coils. When a batch of oil or tallow is required steam is introduced and the temperature of the material is raised to 37°-43° C. to permit pumping. The caustic soda is stored in steel tanks in the processing buildings. The same equipment is used for refining and bleaching both tallow and oil. There is one tank for refining and two for bleaching. Directly under the refining tank is a rectangular tank for holding the foots from the refining operation. Tallow and coconut oil for use in making toilet soaps require decolorisation or bleaching. These two raw materials are given somewhat similar treatments. Practice has shown that better decolorisation results from first refining the material and then bleaching. The materials are pumped indoors into the refiner, diluted caustic is added to neutralise the free acids, and to remove any mucilaginous matter that may be present in the tallow or oil.

Bleaching Tallow and Oil

In the bleaching process different adsorbent combinations are used for the tallow and oil and they are bleached to different colour standards, and then stored separately. A measured volume of tallow is charged into the bleach tanks, agitation started and heat applied. When a temperature of 66° C. is reached the activated fuller's earth and activated carbon are added. The temperature is raised to about 115° C. and the agitation continued. The temperature is maintained for a few minutes to drive off completely all moisture from oil, clay and carbon and then lowered to about 105° C. The tallow or oil and bleaching agents are passed through a filter press and the clear filtrate flows by gravity to storage tanks on the floor below. When steaming the filter press, any stock extracted from the cake is retained in the condensate tank. Water is drained off and the stock is returned to the bleach tanks. Saponification of the fats is carried out in huge soap kettles, the process requiring several days.

Measured volumes of refined tallow and coconut oil are pumped into the kettles. The open steam coils are turned on and just enough steam is admitted to agitate the fats gently. A moderately diluted caustic soda solution from the previous boiling operation is run in slowly. Gentle boiling is continued and after a period the mass begins to thicken owing to partial saponification. When the operation is complete it is necessary to separate or "grain out" the soap. For this purpose granular salt or a salt brine solution is added while the kettle contents are boiling. When the contents of the kettle have been allowed to settle, the heavier lye is drained from the bottom and pumped to storage tanks, where it is cooled before being sent to the glycerine department. In the second "killing change," steam from the open coils in the kettle is turned on and water is added until the soap boils. Boiling continues until the soap is "closed," and the remainder of the tallow and coconut oil for the batch is added to the kettle while it is boiling. Caustic is added in the same way as in the first killing change and graining then follows earlier procedure.

Lye Drawn Off

The purpose of the next (strong) change is to saponify completely the charge in the kettle by killing or saponifying the last traces of fat and oil. Steam and water are added and boiled until the soap is closed. Caustic is added slowly. After the completely saponified soap has been boiled a sufficient length of time it is again grained out. The contents of the kettle are settled and the lye is drawn off. In order to reduce the alkali content to a minimum it is necessary to give the soap several washes, using salt or brine as the graining medium and it is then ready for the "finish." Steam is turned on and the soap is brought to boiling, water being added until the soap closes. The object is to get the soap in such a condition that the darker soaps and impurities separate from the lighter soap and settle to the bottom of the kettle. After the soap has been finished in the kettle and allowed to settle, the better, "neat," soap forms an upper layer and below it is a softer, slightly darker soap in which colouring matter and other impurities are concentrated. It is known in the industry as "nigre." This nigre is reboiled to remove salt and caustic, and is then used to make household laundry soap flakes. The liquid white soap remaining in the kettles at a temperature of 93° C. is passed through a Cuno pressure filter and then pumped through an asbestos-covered pipe line over a bridge to the finishing department in another building. Here the hot liquid soap containing about 30 per cent. moisture is stored in large tanks. It is later carried to a tunnel dryer, this opera-

* From an article by James A. Lee in *Chem., Met., Eng.*, 1942, **50**, 5, 125.

tion reducing moisture content to about 14 per cent. The soap is then carried to any one of four bins above the milling machines. A weighed charge is put into the amalgamator, perfume and pigment are added and, after thorough mixing, the soap is passed through the intermediate plodder from which it is extruded in spaghetti-like form. The soap is extruded from a final plodder in two 1¼-in. diameter rods, which are cut into blanks of 5 in. in length and then pressed into the cakes of soap. The wrapping and packaging in cartons is done by lines of automatic machines and conveyors. The nigre, or dark soap, which was separated from the lighter layer in the kettle, is re-boiled and settled to remove impurities and then filtered and pumped to the finishing building where it is stored in a tank on the top floor. It leaves the dryer in the form of flakes and is conveyed by belt to a storage bin.

In addition to these products there is the increasingly important glycerine. Lye removed from the soap kettles flows to large steel storage tanks on the outside of the building. The bottoms of these tanks are at an angle to the ground to simplify cleaning. After 24 hours the cooled lye is pumped to cypress tanks nearby where it is treated with alum to coagulate and remove soap and albuminous materials. The treated lye is then filtered through a press in the glycerine department and the clear filtrate is run to cypress storage tanks outside. From there it goes to the evaporators. The perfuming operation in soap making is extremely important. Between forty-five and fifty essential oils are blended and the mixture aged for several weeks. The world conflict is rapidly putting a stop to the importation of these perfume oils and in all likelihood in 1943 America will be entirely dependent upon synthetic oils for soap perfumery.

The soap plant has its corrosion problems and must use special materials of construction to increase the life of equipment and to prevent the discoloration of its products. It has been found satisfactory to use nickel-clad steel for the section of the soap kettle that is generally above the liquor level. The glycerine-lye evaporators contain copper tubes, and 5 per cent. nickel steel castings. Red brass is used for all pipe lines handling salt brines or salt slurries. While coconut oil attacks plain steel, aluminium steam coils have been satisfactory in the storage tanks. Cypress wood tanks are used for storing certain of the glycerine-lye liquors. Chemical engineers have found that centrifugal pumps have proved most satisfactory for handling the soap and glycerine liquors.

Some New American Patents

Treatment of Dyestuffs and Motor Spirit

UREA, the first organic compound to be synthesised in the laboratory, may now be used in producing textile dyes which do not change in shade or become discoloured. The method, devised by Richard Haynn, of Frankfurt, Germany, and now being used in the United States, solves the problem created by substantive dyes and colour changes on wool and cotton. To overcome this difficulty it had been attempted to carry out the dyeing in an acid dye-bath. But this is said to have resulted in uneven shades, since the dye coloured the wool more intensely than the cotton in textile mixtures. This can now be circumvented, the inventor asserts, by adding small amounts of urea to the dye-bath, eliminating the use of acid baths and facilitating the production of even tints.

"Sweetening" Petrol

After the war, when petrol is once again plentiful, refiners will probably "sweeten" the spirit by means of a new method discovered by Donald Swissvale and Joseph Nickels, of Pittsburgh. The method reported has many advantages over the old "sweetening" practices. The petrol is treated with sodium plumbite, a lead compound which reacts with the unpleasant-smelling mercaptans in the petrol. Next, just sufficient sulphur is added to convert the lead sulphur compounds to so-called alkyl sulphides. Borax is then added. This causes the sulphides to settle out quickly and separate from the petrol. The advantage of this method is that the fuel is said to have an "improved response" to anti-oxidant and anti-knock compounds. When these compounds are added, the fuel resists gum formation and shows improved anti-knock properties.

New Anti-Knock Spirit

The Texas Company has developed a new anti-knock petrol synthesised from carbon monoxide and hydrogen. The two gases are brought together in the presence of a catalyst and are thus converted into a mixture of various hydrocarbons, including butanes and butylenes. The butane is then isomerised with the formation of isobutane. This is then reacted with the butylene in the presence of another catalyst which causes the two to react with the formation of liquid hydrocarbons, making up a type of petrol which has high anti-knock value and vaporises within the range of motor-spirit.

Spot Tests

Further Applications of a New Principle

From Our Analytical Correspondent

A NEW spot method of Feigl and da Silva primarily devised for detecting basic properties in slightly soluble substances, but capable of many ingeniously devised applications, was recently described in these columns (CHEMICAL AGE, 1942, *46*, 303). There has now been published a complementary method for the detection of acidity, based on similar principles (Feigl and Barbosa, *Ind. Eng. Chem., Anal. Ed.*, 1942, *14*, 519).

In this new test the reagent is an equilibrium solution prepared by reacting silver chromate with an amount of aqueous ammonia or aqueous ethylene diamine insufficient to cause complete solution, *i.e.*, leaving some of the silver unconverted to complex ammine. The reagent solution, freed from unchanged salt, is in a state of delicate balance. It will therefore react immediately with any substance which will take up ammonia or ethylene diamine, depositing silver chromate. Such an alteration of the equilibrium may arise in one of three ways: by the furnishing of hydrogen ions which will remove the base from the complex (true acidity); by surface adsorption of the base; or by formation of a new complex.

Of the two reagent solutions, that dependent on ammonia is the more convenient to prepare, but it is inferior because of the ease with which it loses ammonia, gradually depositing crystalline silver chromate. However, this need cause no serious difficulty, since the crystals thus formed are so dark as to appear almost black, and they form slowly; while the precipitate obtained in a positive reaction is reddish brown, and forms rapidly—in most instances immediately. The ethylene diamine reagent, because of the lower vapour pressure of the base, is much more stable.

Preparation of the Reagent

Freshly precipitated silver chromate is thoroughly washed to free it from excess of silver nitrate or potassium chromate, and is either shaken in the cold with 6 *N* ammonia, or at 60° C. with aqueous ethylene diamine. Further amounts of the solid are added as solution takes place, until finally there is a fair excess. Simple filtration then gives the ammoniacal reagent in a condition suitable for use, and it may be stored in a bottle with a well fitting stopper. The ethylene diamine complex is deposited as crystals on cooling the filtered solution in ice and allowing it to stand for twelve hours. These crystals, washed once with cold water, are then dissolved in warm water to give a stable reagent solution. The test is most conveniently carried out on a white spot plate.

Apart from the application to the straightforward detection of acidity, certain other uses for these reagents are quoted. The aqueous solutions of salts produced from weak bases and strong acids show, as is well known, an acid reaction (*e.g.*, aluminium and ferric sulphates). The special reagents react positively with such solutions, and the test is stated to be particularly sensitive for aluminium. It will give a positive result at a dilution of 1 :250,000, when no precipitate of aluminium hydroxide can be observed on treatment with ammonia alone.

Special Applications

Certain natural minerals, such as zeolites and kaolin, give a positive test, while others, of which talc and muscovite are representative, give no result. This behaviour is presumed to be dependent on the silica in the mineral, and therefore is not the result of acidity. Further investigation of the various forms of silica shows that while crystalline varieties such as sand and quartz show no reaction (as is to be expected), a precipitate of hydrated silica even after ignition will give a positive test. In this case at least, the precipitation of the silver chromate must be considered as resulting from adsorption phenomena.

Rather less explicable are the behaviours of the oxides of niobium and tantalum. The former shows a positive reaction while the latter is inert towards the reagent. The distinction is removed by ***strong*** ignition of the oxides, both then failing to react; but in the absence of this treatment, Feigl and Barbosa recommend the test for the purpose of differentiation. They do not, however, propose any very satisfactory explanation.

The third class of reaction mentioned above is exhibited by the ions of metals such as copper, cobalt, nickel, and zinc. These will form complexes which are more stable than those with silver. The sensitivity of the test for these metals will vary with the stability of the corresponding complex. The authors suggest that this should be used as a preliminary test in qualitative analysis to indicate the possible presence of one of the complex-forming metals. It is especially recommended as a test for the zinc ion, when applied to the ammoniacal filtrate left after the removal of the aluminium group.

This acid detector will doubless find considerable application in conjunction with the test for basic properties; and with the possibilities of both tests fully developed, analysts should have every reason to be grateful to Feigl and his co-workers.

Personal Notes

MR. T. A. FAUST, of Yocum Faust, Ltd., London, Ontario, has been elected President of the Canadian Chemical Association.

DR. REGINALD S. DEAN, chief of the Metallurgical Division, Bureau of Mines, U.S. Department of the Interior, for the last ten years, has been appointed assistant director of the Bureau.

MR. F. T. HAMBLETON, manager and chemist of Macclesfield Corporation sewage works, has been elected a fellow of the Institute of Sewage Purification.

MR. HERBERT HOLDSWORTH, representative of the "Killgerm" Company, Ltd., disinfectant manufacturers, and GUNNER BERTIE FORD, who was employed at the chemical works of Fison, Packard & Prentice, Ltd., Bramford, Suffolk, have been reported missing in the Middle East.

MR. E. M. FRASER, formerly a member of I.C.I., Ltd., who has been serving as Director of Investigations and Statistics at the War Office, has been released by the Secretary of State for War in order that he may take up the appointment of Director-General of Equipment Production at the Ministry of Aircraft Production.

DR. W. LAWRENCE BALLS, Sc.D., F.R.S., has been awarded the rare distinction of Honorary Fellowship of the Textile Institute, for his work in improving the quality and performance of cotton, particularly in Egypt. The famous Giza cotton types are a living witness to the success of his efforts in this branch of applied science.

MR. STUART R. ZIMMERLEY, expert in ore-dressing methods for minerals, has been appointed regional engineer at the Salt Lake City, Utah, office of the U.S. Bureau of Mines, and MR. EUGENE D. GARDNER, supervisiting engineer of the South-West experiment station of the Bureau at Tucson, Arizona, since 1925, has been appointed regional engineer in charge of the Central States office at Rolla, Missouri.

MR. BERNARD COLLITT, F.C.S., F.I.C., F.C.I.C., who has been metallurgist with Jenkins Bros., Ltd., in Canada for 12 years, has been elected a director of the company. Mr. Collitt is a native of Lincoln, England, and was educated at Queen Elizabeth Grammar School, Gainsborough, completing his chemical training in London and his metallurgical education in Sheffield and in Germany. He went to Canada in 1909, but returned to his native city during the last war to act as chief chemist and metallurgist to Ruston & Hornsby, Ltd. Mr. Collitt is a member of the Society of Chemical Industry and of the Institute of Metals, and an associate member of the B.C.I.R.A.

DR. ARTHUR LABRIE and DR. ELPHEGE BOIS have been elected presidents of the Quebec Chemistry Society and of the Quebec section of the Canadian Institute of Chemistry.

DR. LEON LORTIE, Universitié de Montréal, was installed as the new President of the Canadian Institute of Chemistry at the recent 25th Canadian Chemical Convention, held at Hamilton, Ontario.

MR. HAROLD MARLAND, of Manchester and Tunbridge Wells, chairman of E. Griffiths Hughes, Ltd., manufacturing chemists, Salford, has lent the Government a large part of his fortune free of interest for the duration of the war.

Obituary

MR. JOHN GEORGE JONASSON, who died at Tynemouth recently, aged 58, was formerly manager of Walker, Parker & Co., Elswick Lead Works, Newcastle-on-Tyne, having been with the firm for more than forty years.

New Control Orders

Carbon Bisulphide

Under the Export of Goods (Control), (No. 30) Order, 1942 (S.R. & O. 1942, No. 1504, price 1d.) which comes into force on August 17, control is extended to cover carbon bisulphide. Licences will, in future, be required to export carbon bisulphide to all destinations.

Petrol Substitutes

The Government has decided that in future no vehicle, whatever fuel is used, shall be allowed to operate for purposes which would not justify an issue of motor spirit or Diesel oil. Since the outbreak of war, vehicles operating on producer-gas, steam, electricity, butane, and propane have been allowed to have free access to whatever fuel has been available. Now, in view of the need for conserving fuel, vehicles, tyres, and man-power, it has become necessary to control the consumption by motor vehicles of fuel of every kind. This will be effected by two orders under the Defence Regulations. The first, which comes into force on September 1, will prohibit the running of vehicles on fuels other than motor spirit or Diesel oil except under a licence.

Licences will be issued on condition that the vehicle is engaged on essential work and that the fuel is available. Owners who intend to convert their vehicles to alternative fuel operation should first obtain the necessary licence from the Regional Transport Commissioner. The second order will bring an "alternative fuel" rationing scheme into operation and is to be issued in due course.

Smokeless Powder

Current Manufacturing Methods in America

BY no means the least important part of America's colossal government ordnance programme is the production of smokeless powder. Like all other items which the Ordnance Department of the U.S. Army is engaged in producing, smokeless powder has benefited by a great number of recent innovations. Some indication of the lines on which the work has been proceeding is given in an article by Colonel R. E. Hardy, of the U.S. Army (*Chem. Met. Eng.*, 1942, *49*, 4, p. 76). The figures, in which the author indicates the scope and size of one plant engaged in smokeless powder manufacture are, as might be expected, astronomical: the cost alone was $100,000,000, and all the accessory services were on a comparable scale. More interesting, however, to the chemical industry is the description of the processes, an outline of which is contained in the following extracts from Colonel Hardy's article.

Cellulose Preparation

The basis of smokeless powder is nitrocellulose, made by nitrating cellulose. Wood or cotton can be used as the source of cellulose, but as wood contains lignin, which must be eliminated, cotton is more conveniently employed as the source for cellulose. Cotton linters are used, since long-staple cotton plugs slurry lines and valves. If the supply of linters should run low, it can be replaced with long-staple cotton which has been chopped up. Oils and other impurities in the cotton are removed by a sodium hydroxide treatment and the cotton is then washed free of alkali and bleached. Cotton received is already processed to this stage. The first treatment given it at the factory reduces the external moisture. Since the heat of dilution of sulphuric acid by this moisture would be considerable, with subsequent danger of fires during nitrating, drying is imperative. This is accomplished in a long continuous oven heated by radiation with steam pipes and provided with conveyors, the cotton being fluffed out of the solid bales at the entrance.

Military nitrocellulose is composed of a mixture of high-grade nitrocellulose and pyro-nitrocellulose. The first of these contains an excess of nitrogen and contributes ease of ignition and high potential characteristics: the second contains a small amount of nitrogen and acts as the vehicle for the insoluble variety (the high-grade type is insoluble in ether-alcohol).

In the nitrating process the cotton, after being weighed into fibre containers, is sent by conveyor to the third floor of the nitrating houses where there are several groups of charging hoppers which supply the dipping pots suspended below the floor. Four pots are included in one nitrating unit. Cotton and nitrating acids are charged into the dipping pots. Beneath these pots and on the second floor are several wringers, one serving each of four dipping pots. Suspended under the wringers are immersion basins serviced with water. The four pots, wringer, and one immersion basin make a complete nitrating unit. In operation the pots are dipped in their order, properly timed so that by the time the fourth pot is dipped, the first charge is ready to be dropped into the wringer. Nitrocellulose is discharged from the wringer into the immersion basin, drowned with water, and flushed into slurry tanks. A system of collecting pipes from the dipping pots conducts acid fumes to a cyclone where the nitric acid is dissolved in water for concentration and re-use.

Removal of Impurities

Impurities remain to be washed out in the next building in the line. This operation is known as the boiling-tub procedure or stabilisation. With the cellulose is always some degraded or decomposed cellulose known as hydrocellulose or oxycellulose. As cellulose is treated with nitric acid, nitric esters of other substances are also obtained. Sulphuric esters also accumulate as a result of esterfication with sulphuric acid. The function of the boiling-tub house is to remove these foreign ester impurities which are inherently unstable.

The slurry entering the boiling tubs contains a small amount of acid expressed as sulphuric. The acid is that resulting from the dilution of the acid left in the nitrocellulose after nitration. The acidic solution is pumped over to the boiling-tub house where it is put into wooden tubs and heated indirectly with steam which is introduced under a false bottom. After the boil is complete, the material is run out of the tubs and put into another intermediate slurry tank. Any free acid is neutralised with sodium carbonate, but the nitrocellulose must be broken up to get at the acid held between the micelle and fibrils of the fibers. This is accomplished, together with preparation for colloiding, in the pulping house. The line is still divided into high-grade and pyro-nitrocellulose.

To accomplish the pulping the alkaline slurry is passed through a series of three Jordan refiners and pumped to the poacher house. The final neutralisation is accomplished here by the addition of more sodium carbonate. Heat and agitation ensures the reaction between the acid and the sodium carbonate. Boilings, settlings, decantations, and rewaterings follow, and the residual sodium carbonate and salts are removed by cold water washes. After each boiling and washing, the slurry is allowed to settle and at least 40 per cent. of volume must be decanted.

Each high-grade and pyro poacher charge is analysed and then pumped to huge vats with umbrella baffles and agitators in the blending and wringer house, and blending produces the

desired nitrogen content. After a sample of the blend has been approved by the laboratory, the nitrocellulose is dewatered as much as possible before going to the dehydrating press. Centrifuging reduces the moisture in pyro cotton to desired percentage. The product is now held in transfer cars ready for the smokeless powder area.

Moisture Adjustment

Smokeless powder was the chief propellant during the last war, but it had two serious defects which have been corrected since. First, moisture was absorbed by pyro powders, causing deviation from ballistic standards; and second, the combustion products of the powder flashed (burned) at the muzzle. The composition of du Pont "FNH" and "NH" powders permits adjustment of moisture to normal humidity at average temperature and because of their composition, they are much less hygroscopic than pyro powders.

Production lines in the smokeless powder area start with a dehydration press house. Here water present in the nitrocellulose is removed and alcohol is substituted. The nitrocellulose is charged into a hydraulic press and compressed by a low-pressure ram. Alcohol is forced in at the bottom of the press under a higher pressure, displacing the water. This process is aided by a partial vacuum applied through performations in the ramhead. The pressure exerted by this ram is then increased and some of the alcohol forced out of the cake. Enough alcohol is left in the block so that all alcohol requirements may be satisfied for the colloidising action within the mixer house.

Colloidising

Actual colloidising is accomplished in the mixer house where the dehydrated alcohol-containing blocks are charged into mixers. In a few minutes the action breaks up the blocks and partially mixes the nitrocellulose and insoluble compounding agents, and then ether containing a stabiliser and plasticiser is added. These ingredients act as plasticising agents and control the burning of the finished product, and thus aid in the elimination of flash. They form a fairly complete colloid of the nitrocellulose and affect the hygroscopicity of the nitrocellulose to a much greater extent than would be expected from the percentage compositions. When powder decomposes, NO_2 fumes are given off which react with moisture to form nitric acid. The acid, in turn, catalyses the decompositions of nitrocellulose. The stabiliser reacts with the NO_2 and removes it.

Material for cannon powder is mixed for a given time, and since rifle powder manufacture differs from this point, further discussion will deal only with cannon powder. The colloidal formation is completed in mixers of a slightly different type, known as macerators; then blocked in presses for convenience in handling.

In the screening and graining house the powder is put through screens in a press in order to remove lumps and impurities. This is called a macaroni press, as powder comes out in string or rope-like form. This is blocked once more and then sent to graining presses which extrude the powder through screens followed by a perforated die. Strings or ropes of powder so obtained are then sent to a cutter where powder grain lengths are regulated.

Removal of alcohol and ether is accomplished by distilling the solvent out of the grains with hot air and then passing the air through a condenser in order to remove the solvent. The powder is put into covered cars which are sent to the solvent recovery building. Here air heated by steam coils is passed through the cars and then partially by-passed through a condenser where much of the picked-up solvent is condensed. All the air is sent back over the coils for recirculation.

Removal of Solvent

After passing through the dump shed house, the uniform powder is conveyed to the water-dry house on a conveyor, or pumped by fast flowing water and put into storage tanks in the water-dry house. Here the remaining solvent is removed. Water preheated by steam is pumped through the tanks so that the solvent may be quite rapidly dissolved out of the powder grains. A portion of the water in the tub is always thrown away with the differential amount of water, but is made up from a hot water tank within the water-dry house. This procedure is followed until the residual solvent left in the powder grains has been decreased to a low percentage. After the powder has been in the water-dry tanks for the required time, the removal of solvent is considered complete The powder now contains water and small amounts of ether and alcohol, and the removal of that water is left to the so-called C. C. (control circulation) dry house. Here the mass is dumped into a bin and hot air, obtained by passing air over a steam coil, is passed through the powder for long enough to bring the moisture content down to a normal average value. The powder is now finished as far as the actual manufacturing processes are concerned.

Blending is next in order, and blending towers with drop hoppers are provided for this purpose. When the trap door of a filled hopper is pulled, the powder drops on to an inverted umbrella-shaped baffle, is scattered, and collected in another hopper. This procedure is carried out until a good blend is obtained. The powder is then sent to the packing houses, weighed into containers, which are then sealed, air-tested, stenciled, and routed to the shipping and storage houses.

Rifle powder manufacture differs in that the powder is coated with various ingredients in order to control the rate of burning. A graphite coat completes the series of steps in the operation.

A description of the acid and organic areas is now in order. Nitric acid is made in the acid

area by the direct oxidation of ammonia. The ammonia is received in liquid form in tank cars and stored. It is first volatilised in a vaporiser equipped with steam coils and then mixed with hot air. This mixture is passed into a catalytic converter in which the fundamental chemical reaction occurs. The resulting nitrogen oxide gases are cooled in a heat exchanger and partially condensed in a bank of condensers. The vapours are eventually put through an absorption tower and the condensate leaving the condenser as dilute nitric acid is also sent to the absorption tower. Counter-current scrubbing of the rising vapours results in 60 to 61 per cent. nitric acid. Gases from the top of the absorption tower are passed through a portion of the heat exchanger, through which the hot converted gases are sent, removing latent heat from the converted gas while being themselves heated. After accomplishing this cooling, the warmed gases are exhausted to the atmosphere through secondary compressors which pump 40-45 per cent. of the air needed for the oxidation process.

If it is to be used for nitrocellulose 60 per cent. acid must be concentrated to approximately 92 per cent. strength. Therefore, it is mixed with 92 to 96 per cent. sulphuric acid and concentrated. First, the mixture of nitric and sulphuric acids is preheated by steam coils and then sent into the top of a dehydrating column packed with chemical ware. From here it goes into a series of steam-heated boiler tubes and the heat drives the nitric acid gases back to the bottom of the dehydrating column. The gases rise in the column and dilute nitric acid falls down, thus producing a stripping action. The sulphuric acid, since it is not volatile and is combined with water, is concentrated for re-use. The nitric acid vapours are then passed through a bleaching column, also packed with chemical ware, and thence to a condenser where the nitric acid is condensed out. It is now at 92 to 95 per cent. concentration.

In the organic area benzene is reacted with nitric and sulphuric acids to form nitrobenzene. This is reduced to produce aniline, which is then either reacted catalytically under pressure with heat to form diphenylamine, or is allowed to react with methyl alcohol and sulphuric acid to obtain dimethylaniline.

Acid Resistance in Chemical Plant

Wide Application of " Staybrite " Steel

THERE is no metal—not even gold or platinum—which cannot be caused to enter into chemical combination by placing it in a suitable environment. The term " stainless " must, therefore, be interpreted in a relative sense and, in a booklet produced by Firth-Vickers Stainless Steels, Ltd., on *Corrosion Resisting Steels for Chemical Plant*, the company is careful to desribe its " Staybrite " steel as being " acid resisting." It is claimed for " Staybrite," however, that it is fully resistant to a very wide range of acids and other corroding media. " Staybrite " steel is an alloy steel which contains substantial quantities of the alloy elements, chromium and nickel, together with certain other elements, such as molybdenum or titanium, added to the different types to render them suitable for certain specialised purposes. Its tensile strength lies in the range 37 to 45 tons/sq. in. It has a yield point of 15 to 16 tons/sq. in., and substantial ductility in the order of 40 to 60 per cent. elongation. It may be formed by hot and cold pressing, deep-drawing and spinning, and may be welded by the electric arc, oxy-acetylene, electric resistance (butt and flash, spot and seam), and the atomic hydrogen methods. " Staybrite " steel is produced in several different types, of which F.D.P. is the standard type employed for acid-resisting industrial plant. In cases where welded equipment is required with a bright polished finish F.S.L. type should be used, although for large scale chemical plant F.D.P. type is to be preferred. " Staybrite " F.M.B. and F.M.L. are special modifications containing molybdenum.

Various aspects of corrosion are discussed in the booklet and interesting examples are given. It states, for instance, that substances which may cause corrosion when boiling under normal pressure may be harmless if boiled under reduced pressure at a correspondingly lower temperature. Indicative of the importance sometimes possessed by minor constituents is the attack which may be caused by small amounts of hydrochloric acid in phosphoric acid, or by the sulphuric acid sometimes present in citric acid solutions. Another example is slight acidity in chloride solutions which has been found to cause serious pitting under certain conditions. On the other hand, other substances in the solution may prevent attack. For instance, it has been found that the plain chromium stainless steel is attacked by acetic acid of the same strength as that present in vinegar, and by citric acid of the concentration found in lemon juice, although it is quite immune from attack by either vinegar or lemon juice itself. Again, copper sulphate present in certain mine waters has been found to prevent the attack on " Staybrite," when the content of sulphuric acid present would otherwise have rendered this steel unsuitable. The wide use of " Staybrite " steel in the dyeing industry for vats which contain boiling solutions made acid with sulphuric acid is rendered possible only by the inhibiting action of the dyes present. Another industrially important example of the beneficial action of certain sub-

stances when present in otherwise corrosive solutions is found in the case of mixed sulphuric-nitric acid solutions. An aspect of corrosion rather different from those discussed above in which the corrosion of the vessel or steel part itself is considered, is the effect of the metallic corrosion product upon the liquor contained in the vessel. For instance, certain dyes are very sensitive to traces of metallic compounds while very small amounts of metallic compounds are sufficient to spoil a certain sensititive fermentation process. When melting gums such as Congo copal for the manufacture of varnish, the presence of quite small traces of metallic salts from the containing vessel is sufficient to ruin the colour of the gum.

Details are given of a wide range of application of "Staybrite" steels. In the manufacture of hydrochloric acid sulphuric acids, it is stated, there is little scope for the use of special steels, but in nitric acid manufacture by the ammonia oxidation process, "Staybrite" F.D.P. steel is used extensively for every item of plant which comes into contact with the acid. A very large tonnage of "Staybrite" steel was used for the first large-scale plant of the kind in this country and increasing quantities of this steel continue to be applied to the same purpose in different parts of the world. "Staybrite" F.D.P. steel it is claimed, is practically unaffected by any strength of nitric acid in the cold, and it is only with the higher concentrations at temperatures approaching boiling point that some attack becomes apparent. In the highest concentrations (e.g. 98 per cent.) its use is not recommended much above normal temperature.

Phosphoric Acid

With phosphoric acid there is a limited application for "Staybrite" F.D.P. steel, but, as the acid is extremely corrosive, F.M.B. and F.M.L. steel should be considered. Since small quantities of other acids, such as sulphuric, hydrochloric, and hydrofluoric, are often present, careful tests should be carried out to determine whether any of these types of steel is suitable for the particular operation under consideration. "Staybrite" F.M.B. steel has excellent resistance to acetic acid and this, unlike that of copper, is not impaired by the presence of air. The lowest member of the aliphatic series, formic acid, is considerably more corrosive than acetic acid. Only "Staybrite" F.M.B. steel should be used, and its application is limited. Special steels are not used in the manufacture of oxalic acid, but, it is claimed, "Staybrite" F.D.P. steel is unaffected by stearic and oleic acids, and withstands the attack of even the boiling acid and vapour, while all types of "Staybrite" steel are fully resistant to the action of carbolic, picric pyrogallic, cresylic, sebacic, and tannic acids. These steels, says the writer, are also resistant to ammonia and alkali carbonates, and to caustic alkalis at normal or intermediate temperatures, although they are attacked by hot, strong solutions of caustic soda and potash. "Staybrite" steel (generally the F.M.B. type) is used in the manufacture of ammonium sulphate for evaporators and centrifugal dryer baskets. Its usefulness depends very much, however, upon the amount of free acid present, and the conditions should be carefully studied. All the "Staybrite" steels are fully resistant to the attacks of nitrates and free nitric acid; but for the manufacture of superphosphates, even the F.M.B. type is suitable only in certain particular cases.

Use in Acetate Process

There is little scope for the use of special steels in the alkali processes for the digestion of wood pulp, and, owing to the presence of free sulphuric acid in the spinning bath, little use is made of them in the viscose process of rayon manufacture; but "Staybrite" steel, with and without the addition of molybdenium, is used for the acetylation of cellulose in the acetate process. This steel may also be used for the dissolving and spinning solutions employed in the cuprammonium process. "Staybrite" steel is not resistant to the action of sulphuric acid, but, it is stated, offers complete resistance over a wide range of mixed nitro-sulphuric acids, and is used with considerable success in a number of nitration processes. It has also found extensive use in the field of fine chemicals and pharmaceutical products. The reagents and products known as fine chemicals are so numerous and complex that it is not possible to list all those which are successfully resisted by the "Staybrite" steels. Mention however, is made of a few salts which do cause attack. Prolonged contact with hypochlorites is to be avoided, and if halogen salts are crystallised at high temperatures, some rusting, with discoloration of the product, is likely to occur, while ammonium chloride, ferric chloride, and mercuric chloride are likely to cause pitting. "Staybrite" F.D.P. steel is suitable for the construction of bleaching equipment operating in neutral or alkaline hydrogen peroxide solutions, and the F.M.B. type is used where bleaching is carried out in moist sulphur dioxide. No type of stainless steel is wholly resistant to the attack of chlorine bleaching solutions over prolonged periods.

A Complicated Question

The writer of this interesting booklet sums up by saying that the whole question of corrosion-resistance is extremely complicated, for not only will certain acid and alkaline conditions aggravate corrosion, but the presence of certain salts will inhibit the action of otherwise corrosive liquors. The foregoing notes will, however, give some indication as to whether or not attack is to be expected, and final decisions should be arrived at only after testing samples of the different types of steel under actual working conditions. If the tests prove satisfactory, he says, almost every metallic part of the plant in contact with the liquor or gas may be made from the appropriate type of "Staybrite" steel.

General News——From Week to Week

Battersea Borough Council is considering the installation of chlorination plant at the Latchmere Road baths at a cost of £260.

It is understood that arrangements with regard to the concentration of the paint industry are well in hand. The Paint Federation is to submit lists of firms shortly to the Board of Trade.

The total value of the output of the Eire soap and allied industries in 1941 was £634,912, compared with £690,966 in the previous year, according to a census of industrial production report just issued by the Department of Industry and Commerce.

Further additions, numbering 325, to the list of traders in neutral countries with whom it is unlawful to deal, are contained in the Trading with the Enemy (Specified Persons) (Amendment) (No. 12) Order, 1942 (S.R. & O. 1942, No. 1431), obtainable from H.M.S.O. or booksellers, price 2d.

Rubble which has been piling up through the centuries round the slate quarries of Cornwall and Wales is now being ground into a coarse powder for use in the making of camouflage paint. In finer form it is also said to be useful as a filler in paint forming an undercoat for metallic surfaces.

The Ministry of Food announces that the only change to the existing prices of oils and fats allocated to primary wholesalers and large trade users during the four weeks ending August 29, 1942, is as follows:—Premier Jus increased by £1 15s. to £51 15s. per ton, c.i.f. in barrels or tierces, duty paid.

The London *Evening Standard* states that the Government has assigned experts to investigate the possibilities of putting methane gas to greater use in view of the fuel situation. In works all over the country, millions of cubic feet of this gas are being wasted by being dispersed into the air or burnt.

At a meeting of the Council of Bradford Chamber of Commerce, Mr. Herbert Hey, the president, referred to the threat to the wool industry "arising from the quantitative and qualitative development of synthetic fibre production," and the danger if productions made from wool are on a non-competitive level after the war.

Pembrokeshire, where the area of land under arable cultivation now exceeds 102,000 acres—nearly three times the pre-war acreage—is adopting on an increasing scale scientific methods of production, says the *Western Mail*. The county hopes to grow enough seed for its own needs, a new departure being the drying of grass by artificial means.

The use of crepe rubber for soles is prohibited, and balata and guttapercha are controlled under licence, in accordance with the Control of Rubber (No. 15) Order, which came into force on August 3.

Foreign News

Cellulose from cane and reed is being made by the Société Française de la Cellulose in a new factory near Marseilles.

Lubricating oils from peat may be produced in Finland if experiments sponsored by the Government prove successful. The Council of State has made a grant of 350,000 fmk. for these experiments.

A factory for drying rose-hips and converting them into powder, preparatory to the extraction of vitamin C, has been built near Sofia, Bulgaria, a country where the wild rose grows in profusion.

Using a large amount of copra, and all the tallow that the Colony of Fiji produces, a local company is making remarkable progress in the production of an increasing variety of soaps and oils, according to press reports.

An inter-trade group for tartar and tartar products has been established in France, under the Secretary of State for Agriculture, to balance resources and needs, organise and control production, and regulate prices, sales, etc.

The Norwegian output of carbolic acid has been increased and crude pyridine is now manufactured, according to Press reports. Road tar is being produced in larger quantities and pitch and distilled tar have been used for making roofing materials.

An article in *The Commonwealth Engineer* of Australia discusses three large producer-gas units recently erected at the works of the Electrolytic Zinc Company of Australia at Risdon, Tasmania, emphasising the development and substitution of producer-gas for oil as a fuel in metallurgical operations.

Pine oil for the flotation of copper is replaced in Sweden by a product, known by the name of "pinol," which is obtained from turpentine. A new outlet for pine oil is in the treatment of apatite which is now being used in Sweden on an increasing scale instead of imported phosphates for fertiliser purposes.

A new hydro-electric plant is to be started shortly on the Santa river, in Northern Peru. This scheme forms part of a project for the establishment of blast furnaces and iron and steel plant, the construction of which, it is estimated, will take three years. The cost is computed at about U.S. $6,000,000, to be financed by the Export-Import Bank of Washington.

Chromium salts and bichromates are to be manufactured in Spain by the Sociedad Electroquímica de Flix.

German manufacturers of earth colours and paints have been ordered to reduce the number of their products to half those produced in 1941. Paints compounded according to customers' specifications may no longer be made.

A/B Bofors, the large Swedish chemical company, is to manufacture aniline oil and salt, but does not plan to produce dyestuffs. Other new products made by this company since the war include nitrobenzol, acetanilide, chloramine, and toluene sulphonic acids.

Production of mercury beyond the present daily maximum of 400 tons is indicated by reports from the Pinchi Lake mine in British Columbia. Increasing attention is also being given to raising the output of selenium by Noranda Mines, Ltd., of Canada, which is the world's largest producers of selenium and which reported improved sales in 1941.

Recent work in the manufacture of high density copper, developed in the Hardy Metallurgical Laboratory, New York, has resulted in greatly improved physical properties. Thus, test bars made from electrolytic copper powder without addition agents show tensile strengths in excess of 30,000 lb./sq. in. and elongations in excess of 30 per cent.

Kali-Chemie A.G. reports that sales increased not inconsiderably in 1941 and were above the average of the last three years before the war. The company is still negotiating the purchase of the electrolytic plant in Alsace, which it now holds under lease. From July 1 a salt pit and chemical plant in Lorraine was leased to the company, and these works are also to be bought outright.

In an effort to supplement the supply of both industrial and edible oils, special attention is being given to the problem of research in the production of vegetable seed oil at the University of Saskatchewan, Saskatoon. Chemists have been engaged and, with Dr. Kirk, dean of the College of Agriculture, as the co-ordinating head, Dr. H. R. Sallans is in charge of the oil seeds laboratory of the Associated Committee on Grain Research. Attention is also given to the wide industrial use of soya beans.

I.G. Farbenindustrie A.G. has decided on another capital increase. The nominal value of the present share capital is raised by one-quarter, from 900 to 1125 million marks, by corrections in the balance sheet valuation of subsidiaries. Besides, 235 mill. mk. new shares are to be issued, so that the total share capital—including 40 mill. mk preference shares—will stand at 1400 mill. mk. The dividend for 1941 has been fixed at 6 per cent. on the increased capital; for the previous year 8 per cent. was distributed.

Swedish makers of bone glue, it is reported, have had to close down because of lack of raw material, as the bones supplied exclusively to glue factories before the war are now used mostly for other purposes.

In order to meet the urgent war-time demand for arrowroot, which is used in production of mucilage, Queensland will attempt a rapid increase in its output of this product. Increased demand involves raising production from 800 to 1800 tons yearly.

Cast iron is being produced in Rumania by a new process which uses domestic lignite and methane gas instead of foreign coke, it is claimed. In addition to effecting a considerable saving in imported coke, the process permits the utilisation of ore having a poor yield.

Lacquer factories in Germany have been reduced in number from 900 to 300 under a concentration scheme. The remaining manufacturers have been given greater liberty in the purchase and use of raw materials, but a stricter control over the sale of lacquers has been instituted under new regulations of the Reich Office for Chemistry.

Helium, the rare non-inflammable gas of which the United States Government has a world monopoly, is to be produced in greatly increased quantities to meet expanding war-time demands. Millions of additional cubic feet will flow from the enlarged plant at Amarillo, Texas, processed from gas produced by U.S. Government wells.

Italian sulphur production in 1940/41 was 7 per cent. smaller than in 1939/40. Sales of carbon disulphide were substantial, but exports of sulphur declined, according to Ente Zolfi Italiana, and the refineries' total sales were therefore smaller. No subsidies were received from the Government in view of the satisfactory financial position, but the industry is suffering from difficulties in transport, labour and raw materials. The mines are to be modernised.

Forthcoming Events

A meeting of the London and S.E. Counties Section of the **Institute of Chemistry** will be held on **August 12,** at 6 p.m., at the Kodak Hall, Harrow, when a lecture will be delivered by Dr. Julius Grant, F.I.C., entitled "Chemical *versus* Forger."

On **August 26,** at 4 p.m., at the Imperial Institute, South Kensington, there will be a conducted visit of the London and S.E. Counties Section of the **Institute of Chemistry** to the Exhibition galleries (tea and film-show included). Only 50 members can be accommodated. Application should be made to the Secretary, and a ballot will be held. Applicants securing places will be informed of their good fortune.

Weekly Prices of British Chemical Products

TRADE in the general chemicals market during the past week has been on a moderate scale with deliveries against existing contracts well up to schedule. A fair amount of new inquiry is reported and values remain firm. In the soda products market a steady demand is reported for nitrate of soda, caustic soda, and bichromate of soda. Supplies of yellow prussiate of soda and chlorate of soda are still scarce. Firm price conditions are the main feature of the potash section with values for yellow prussiate of potash nominal. A steady inquiry is reported for phosphate of potash, bichromate of potash and caustic potash. A brisk demand is reported for acetone and formaldehyde, while arsenic is a good market,. There has been no outstanding feature in the coal tar products market and the inquiry for new business has been on a moderate scale. Deliveries of crude and crystal carbolic acid have continued on a steady scale, while cresylic acid and creosote oil are also in good request.

MANCHESTER.—Most traders on the Manchester chemical market during the past week seem to agree as to the quietening effect of holiday conditions on business generally, both as regards the pressure of contract supplies and the volume of new bookings, although, on the whole, delivery specifications have been reasonably satisfactory. Price conditions throughout the market are undoubtedly on a firm basis and where changes are indicated the tendency is towards higher levels. Fair quantities of the alkalis and most of the acid products are being called for, while a quietly steady business has been reported this week in the magnesia and ammonia compounds. Good quantities of the leading by-products are moving into consumption, though fresh buying has been of smaller dimensions.

GLASGOW.—Business in the Scottish heavy chemical trade still remains unchanged. Home business is still rather quiet while export trade prices remain firm; in some instances advances in price have occurred as from August 1.

Price Changes

Rises: Concentrated Fertilisers, India Rubber Substitutes, Red Lead, White Lead. Pitch, Sodium Sulphate (Salt Cake).

Falls: Ammonium Sulphate, Antimony Sulphide, Carbon Bisulphide, Caustic Potash.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./ 1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.; 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £14 10s. per ton, f.o.b.

Aluminium Sulphate.—£10 5s. to £11 5s. per ton d/d.

Ammonia Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Carbonate.—£37 10s. per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Antimony Oxide.—£111 to £117 per ton.

Arsenic.—For 1-ton lots, £41 to £46 per ton, according to quality, ex store; for 20-ton lots; £35 to £40 per ton d/d. Intermediate prices for intervening quantities.

Barium Chloride.—98/100%, prime white crystals, £16 15s. per ton, bag packing, ex works; imported material would be dearer.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £31 10s.; crystals, £32 10s.; powdered, £33; extra fine powder, £34; B.P. crystals £40 10s.; powdered, £41; extra fine, £42 per ton for ton-lots, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £83; powder, £84 per ton in tin-lined cases for home trade only, packages free, carriage paid.

Boric Acid.—Commercial, granulated, £52 15s.; crystals, £53 15s.; powdered, £54 15s.; extra fine powder, £56 15s.; B.P. crystals, £61 15s.; powdered, £62 15s.; extra fine powdered, £64 15s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£10 10s. to £14 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 5d. per lb., less 2½%, d/d U.K.

Citric Acid.—1s. 5½d. per lb., normal; imported material, 1s. 10d. per lb. MANCHESTER: 1s. 8d. per lb.

Copper Oxide.—Black, £95 per ton.

Copper Sulphate.—About £31 per ton f.o.b. MANCHESTER: £31, less 2%, in 5-cwt. casks f.o.b. Liverpool.

Cream of Tartar.—100%, £18 12s. per cwt., less 2½%, d/d in sellers' returnable casks.

Formaldehyde.—£24 5s. to £25 10s. per ton d/d. MANCHESTER: 40%, £24 to £26 per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity in drums, £3 12s. 6d. to £4 6s. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 5½d. to 8s. 11d. per carboy d/d according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Dark tech., 50% by vol., £40 10s. per ton. Not less than one ton lots ex works; barrels returnable, carriage paid.

Lead Acetate.—White, 51s. to 54s. per cwt. MANCHESTER: £51 to £54 per ton.

Lead Nitrate.—About £47 per ton d/d in casks.

Lead, Red.—English, 5/10 cwt., £45 per ton; 10 cwt. to 1 ton, £44 15s.; 1/2 tons, £44 10s.; 2/5 tons, £44; 5/20 tons, £43 10s.; 20/100 tons, £43; over 100 tons, £42 10s. per ton, less 2½%, carriage paid, non-setting red lead, 10s. per ton dearer in each case.

Lead, White.—Dry English, less than 5 tons, £55 10s.; 5/15 tons, £51 10s.; 15/25 tons, £51; 25/50 tons, £50 10s.; 50/200 tons, £50 per ton, less 5 per cent. carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £67; 5/10 cwt., £66; 10 cwt. to 1 ton, £65 10s.; 1/2 tons, £64; 2/5 tons, £63; 5/10 tons, £61; 10/15 tons, £60; 15/25 tons, £59; 50/100 tons, £58 10s. per ton, less 5% carriage paid.

Litharge.—1 to 2 tons, £44 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride.—Solid (ex wharf), £14 to £18 per ton. MANCHESTER: £14 to £16 per ton.

Magnesium Sulphate.—Commercial, £12 to £14 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 11s. 7d.; bichloride lump, 12s. 2d.; ammon. chloride powder, 13s. 5d.; ammon. chloride lump, 14s.; mercurous chloride, 13s. 9d.; mercury oxide, red cryst., B.P., 15s.; red levig. B.P. 15s. 6d.; yellow levig. B.P. 14s. 9d.; yellow red, 14s. 4d.; sulphide, red, 12s. 11d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£60 to £65 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Basic price for 50-100 ton lots. Solid, 88/92%, commercial grade, £55 7s. 6d. per ton, c.i.f. U.K. port, duty paid. Broken, £5 extra; flake, £7 10s. extra; powder, £10 extra per ton. Ex store, £3 10s. supplement. Liquid, d/d, £26, in lots of 1 to 10 tons, under 1 ton, £27 10s., ex store.

Potassium Bichromate.—Crystals and granular, 7½d. per lb.; ground, 8½d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Basic prices for 50 to 100 ton lots; calcined, 98/100%, £52 10s. per ton, c.i.f. U.K. port. Ex warehouse, £55 5s. per ton.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, £40 to £45 per ton ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 10d. per lb. for 1 cwt. lots; for 3 cwt. and upwards, 1s. 9½d. per lb.; technical, £7 18s. 6d. to £8 10s. 6d. per cwt., according to quantity d/d.

Potassium Prussiate.—Supplies scarce, prices nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Soda, Caustic. — Solid 76/77%; spot, £15 7s. 6d. per ton d/d station.

Sodium, Acetate.—£40 per ton, ex wharf.

Sodium Bicarbonate (refined).—Spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 5½d. per lb., anhydrous, 6d. per lb., net d/d U.K.

Sodium Bisulphite Powder.—60/62%, £17 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£21 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, d/d, according to quantity.

Sodium Hyposulphite.—Pea crystals, £20 per ton for 2-ton lots; commercial £14 15s. per ton; photographic, £25 5s. per ton.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 6d. per lb., for not less than 7 lb., 13s. 1d. per lb.

Sodium Metasilicate.—£16 per ton, d/d U.K. in 1-ton lots.

Sodium Nitrate.—Refined, £15 5s. per ton for 6-ton lots d/d.

Sodium Nitrite.—£21 to £23 per ton for ton lots.

Sodium Percarbonate.—21½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £23 to £28 per ton d/d for ton lots. Tri-sodium, £26 to £30 per ton d/d for ton lots.

Sodium Prussiate.—7¾d. to 8½d. per lb. ex store.

Sodium Silicate.—£9 10s. to £10 12s. 6d. per ton, for 4-ton lots.

Sodium Sulphate (Glauber Salts).—£4 10s. ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 12s. 6d. per ton d/d station.

Sodium Sulphide.—Solid 60/62%. Spot, £17 15s. per ton d/d in drums; crystals, 30/32%, £12 7s. 6d. per ton d/d in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, spot. £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—For quantities not less than 4 tons, unground, unsieved and ungraded, £14 5s. per ton, ex store. Ground and sieved, £15 to £16 10s. per ton, ex store, according to mesh. Controlled prices.

Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—4s. 4d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 4s. 4d. per lb.

Tin Oxide.—Snow white, 305s. per cwt.

Zinc Oxide.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d.

Zinc Sulphate.—Tech., £20-£21 per ton, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 2d. to 2s. 1½d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Bisulphide.—£34 per ton, according to quality, in free returnable drums.

Carbon Tetrachloride.—£46 to £49 per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes. White, 6 3/16d. to 10¼d. per lb.; dark, 6 3/16d. to 6 15/16d. per lb.

Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£45 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.
Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—Type B, See Concentrated Fertilisers.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, August, £9 10s.; increased charge of 1s. 6d. per month up to March, 1943.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton in 6-ton lots d/d farmer's nearest station, in August: I.C.I. Type, "Special III," £14 9s. 6d.; Type "B," £14 1s. 3d.; Type "C," £17 19s. Increased charge of 1s. 6d. per month up to March, 1943.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 5s. per ton; granulated, over 98%, £14 10s. per ton. Surcharges for smaller quantities unless collected at warehouse or depots.

Coal Tar Products

Benzol.—Crude, 60's, 1s. 10d.; pure 2s. 6d., per gal., ex works.

Carbolic Acid.—Crystals, 10d. to 11d. per lb. Crude, 60's, 4s. 3d. to 4s. 6d., according to specification. MANCHESTER: Crystals, 9½d. to 11½d. per lb., d/d; crude, 4s. to 4s. 6d., naked, at works.

Creosote.—Home trade, 6½d. per gal., f.o.r., maker's works; exports, 6d. to 6½d. per gal., according to grade. MANCHESTER: 6½d. to 9d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 6d. MANCHESTER: Pale, 99/100%, 4s. 6d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 2d. to 2s. 6d. per gal.; heavy, 90/190°, 1s. 10d., naked at works. MANCHESTER: 90/160°, 2s. 2d. to 2s. 6d. per gal.

Naphthalene.—Crude, in 4-ton lots, in sellers' bags, £6 6s. 8d. to £9 7s. 7d. per ton, according to m.p. In sellers' bags, 2s. ton lots; hot-pressed, £11 3s. to £11 8s. per ton; purified crystals, £19 to £35 per ton. Controlled prices.

Pitch.—Medium, soft, 45s. to 55s. per ton, f.o.b. MANCHESTER: 45s. per ton at works.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 13s. to 14s. MANCHESTER: 14s. to 18s. 6d. per gal.

Toluol.—Pure, 2s. 5d. nominal; 90's, 1s. 10d. per gal. MANCHESTER: Pure, 2s. 5d. per gal. naked.

Xylol.—Commercial, 3s. 1d. to 3s. 5½d. per gal.; pure, 3s. 2½d. to 3s. 7d. MANCHESTER: 2s. 8d. to 3s. 1d.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. per gal.

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—August 5.—For the period ending August 29, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies: LINSEED OIL, crude, £46 10s. RAPESEED OIL, crude, £48 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £43 10s.; refined deodorised, £44 10s. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £35 10s. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £35 10s.; refined hardened deodorised, £39 10s. PALM OIL, refined deodorised, £41 10s.; refined hardened deodorised, £44 10s.; GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £44 10s.; refined hardened, £48 10s.; deodorised, £49 10s. WHALE OIL, crude, hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £37 10s. ACID OILS—Groundnut, £19; soya, £17; coconut and palm kernel £22 10s. ROSIN, 26s. 6d. to 33s. per cwt., ex wharf, according to grade. TURPENTINE, American, 90s. per cwt. in drums or barrels, as imported (controlled price).

Chemical and Allied Stocks and Shares

UNCERTAINTIES as to the next turn in war developments dominated sentiment in Stock Exchange markets, where the volume of business remained small. Nevertheless, the general undertone was steady in the continued absence of any heavy selling, and, on balance, movements in security values were moderate in character.

Imperial Chemical ordinary have improved from 32s. 10½d. to 33s 3d. at the time of writing, it being pointed out that on the basis of last year's 8 per cent. dividend, the yield compares favourably with that on many other leading industrial shares. I.C.I. 7 per cent. preference, however, eased slightly from 33s. 10½d. to 33s. 7½d. A fair amount of attention continued to be given to shares of companies with interests in plastics; Erinoid 5s. ordinary have further improved from 8s. 6d. to 9s. 3d., while Lacrinoid Products were 4s. 3d. compared with 3s. 10½d. a week ago, and British Industrial Plastics were 4s. 7½d. In other directions, Fison Packard have changed hands at 37s., and as usual B. Laporte remained very firmly held and were again quoted at 66s. 3d. British Glues & Chemicals 4s. shares were around 6s.; business at 31s. was recorded in the 8 per cent. participating preference. W. J. Bush 5 per cent. £5 preference, which are tightly held and do not often change hands, transferred at 98s. 9d. at one time. Lever & Unilever were fairly steady around 29s., and there was a better tendency in Dunlop Rubber, which at 28s. showed an improvement of 6d. on balance, while Turner & Newall were slightly better at 68s. 6d.

Following publication of the full report, Richard Thomas 6s. 8d. ordinary were little changed at 7s. 1½d. On the other hand, Baldwins 4s. ordinary improved slightly to 6s., and Consett Iron 6s. 8d. shares were quoted at 7s. Moreover, Dorman Long improved a few pence to 19s. 9d. Staveley were 42s. 9d., and Stewarts & Lloyds 46s. 3d., while Tube Investments were 84s. 9d. Elsewhere, British Plaster Board were higher at 24s. 6d., having remained under the influence of the chairman's annual review. Imperial Smelting held their recent improvement to 11s. 9d., and there were a number of dealings around 11s. 4½d. in General Refractories. Textile issues received more attention in some directions, aided by market hopes that improvement in earnings may be continuing. Bleachers ordinary and preference were 6s. and 13s. 9d. respectively, and Calico Printers ordinary were slightly higher at 8s. Courtaulds were 37s., and British Celanese 11s.

More attention was given to Low Temperature Carbonisation 2s. shares, which transferred around 1s. 10½d. Boots Drug 5s. ordinary remained firmly held and were 36s. 6d. It is realised that the yield on the latter is small, but in the case of many leading industrial securities the disposition is for the strength of the balance-sheet position to be the main factor influencing the market value of the shares. British Drug Houses were again 18s. 9d., Timothy Whites 22s. 10½d., and Sangers 16s. 7½d. After a small reaction, the units of the Distillers Co. rallied to 77s. 9d., and were unchanged on balance for the week, while United Molasses had a firmer appearance at 28s. 6d. Borax Consolidated were higher at 31s. 9d., while United Glass Bottle transferred at 55s. 6d. awaiting the interim dividend announcement. Triplex Glass were better at 33s.; market estimates of the dividend for the past year's working range from 10 per cent. to 15 per cent.

A further rally from 31s. to 31s. 6d. was shown in Barry & Staines, while Nairn & Greenwich remained firm at 51s. 3d., and Wall Paper Manufacturers deferred units higher at 27s. 9d. Business at 15s. 3d. was recorded in Cellon 5s. shares, and around 11s. 1½d. in Goodlass Wall 10s. ordinary. International Paint shares rose further from 96s. 3d. to 97s. 6d. Monsanto Chemicals preference were again 22s. 6d., and Lawes Chemical changed hands at 8s. 9d. British Match remained steady at 34s. 6d. Only moderate movements were shown in leading oil shares. Greef-Chemicals Holdings 5s. units were quoted at 5s. 7½d. following publication of the financial results.

Parliamentry Topics

Polyvinyl Chloride

LAST week in the House of Commons, Mr. Parker asked the Minister of Supply whether his pronouncement that there was to be production in this country of substantial quantities of rubber-substitute material referred to the plant for the production of polyvinyl chloride; to which Sir A. Duncan replied in the affirmative. Answering a further question from Mr. Parker, the Minister stated that, in addition to the Ministry of Supply's research organisation, a committee consisting of representatives of the scrap rubber, reclaim and rubber fabricating industries advised on technical questions concerning reclaimed rubber, and that there was constant interchange of technical information between the Ministry and the corresponding Departments of the United States and Dominion Governments.

A company has been formed in Berlin for the collection of pancreatic glands from slaughteryards in Latvia, Lithuania, Estonia and other occupied eastern territories.

COMPANY MEETING

Beechams Pills

Centenary of the Business : Mr. Philip Hill's Speech

THE fourteenth ordinary general meeting of Beechams Pills, Ltd., was held on July 29 at the May Fair Hotel, Berkeley Street, London, W., Mr. Philip E. Hill (chairman of the company) presiding. The Acting Joint Secretary (Mr. F. A. Holden) read the notice convening the meeting and the report of the auditors.

The Chairman said: Ladies and gentlemen, for the tenth successive year our trading profits for the period under review at £1,175,646 show a substantial increase. A particularly pleasing feature of this interest is the fact that the profits of our overseas business before charging foreign and British taxation are approximately £132,000 in excess of that of the previous year.

Contribution to Exchequer

Our contribution to the National Exchequer in the form of taxation amounts for the year to £1,138,365, and this sum does not include amounts paid in purchase tax. It is estimated at the moment that, as the result of excess profits payments up to March 31, 1942, we shall be entitled, subject to such conditions as may be imposed by Parliament, to a refund, after deducting income-tax thereon assumed at the present rate of 10s. in the £, of approximately £88,500. This sum, of course, is not included in the accounts for the year.

The incidence of war, with the restriction of raw materials, selling quotas and other trading difficulties which it inevitably entails, combined with increased taxation, has prevented shareholders from receiving any benefit in the form of increased dividends as the result of the acquisition of Macleans, Enos, and the County Perfumery Company. Nevertheless, we have every cause for satisfaction at having included these businesses in the Beecham group, although the increased profits from them are, for the time being, passing to the Chancellor of the Exchequer.

Generally, our products are deservedly increasing in popularity, both at home and overseas. The company continues to pay particular attention to research and development, and we have been fortunate in securing the assistance of some of the best brains in the scientific world.

History of the Business

It will be of interest to shareholders in the company to realise that this is the centenary year of the Beechams Pills business, on which our present organisation was founded and developed, as the manufacture of Beechams Pills by the late Mr. Thomas Beecham was started at Wigan in 1842. The business succeeded from its inception, despite the fact that in the year of its creation the country had to face what was then considered a crippling burden in the form of Peel's income-tax, which imposed an income-tax of no less than 7d. in the £.

Origin of a Famous Slogan

A few years later Mr. Beecham removed his business to St. Helens, which has been its home ever since. Our factory was rebuilt in 1887, and was extended and completely modernised in 1935. Mr. Beecham at one time made it a practice to visit various towns on market days. On one occasion, after proclaiming the merits of his product in the market place, a woman in the crowd called out: "He's right—they're worth a guinea a box." So this, one of the oldest and most famous of world slogans, owes its origin to the unsolicited testimonial of a grateful customer and not, as might be imagined, to the fertile brain of an astute advertising agent.

Mr. Beecham, who was born in 1820 and died in 1907, made no attempt to merchandise anything but his pills. Since that time, however, there have been big developments. Beecham's powders and Beecham's lung syrup have been successfully marketed, and in addition the company has acquired controlling interests in many other concerns, owning not only other world-famed medicinal products, but many other articles of universal use and consumption. To-day these include foods, toilet soaps, toothpastes, mineral waters, hair lotions, creams, shampoos, cosmetics of every description, agricultural and veterinary products, and medicines for dogs and cats.

Future Extension

It is the intention of the board, as and when opportunity occurs, to extend still further its operations in universal products of every description, and to broaden the base of the group's construction with other medicinal products. Our business is firmly established throughout the British Dominions and Colonies, in the U.S.A., and also in the countries of Latin-America. As soon as circumstances permit, we intend to develop our business in every part of the world. For this purpose it is proposed to utilise any refund of excess profits tax—and thus we hope to play a part in the essential post-war task of increasing our national exports.

The staffs of our companies have been seriously depleted. We would not have it otherwise and we are proud that our men

and women can be found in every branch of the armed Forces and every form of national service. We are not forgetful of the claims they and their dependents have on the company. To those who are still able to devote their time to the work of the company, our thanks are due. Their task is a difficult one.

Current Year's Prospects

This is not a time when one can indulge in prophecy. I can only express the hope that I shall be able to tell you next year that the second centenary of the Beecham business has started even more successfully than the first has ended.

The chairman concluded by moving the adoption of the report and accounts. Mr. J. Stanley Holmes, M.P., the managing director, seconded the motion, which was carried unanimously, and the dividends recommended were approved. The proceedings terminated with a hearty vote of thanks to the chairman, directors and staff.

Company News

The Standard Chemical Company, Ltd., of Canada, reports a net profit, for the year ended March 31, of $122,873 ($54,921), and has declared a total dividend of $1.25 per share (same).

Harben's Viscose Silk Manufacturers have declared a dividend of 8 per cent. on the 8 per cent. first cumulative participating preference stock for year to December 14, 1931.

New Companies Registered

Plyformers, Ltd. (375,266).—Private company. Capital: £2000 in 2000 shares of £1 each. Manufacturers of and dealers in plastic modelling and moulding materials, scientific instruments, rubber, guttapercha, and vulcanite, and goods made therefrom, compositions, glues, cements, pastes, adhesives, chemicals, drugs, etc. Directors: W. Doherty, R. Faulkner. Registered office: 87 Cross Street, Sale, Cheshire.

Ball Eye Mines, Ltd. (375,308).—Private company. Capital: £1000 in 1000 shares of £1 each. To search for, raise, work and deal in fluor spar, pyrites, ochre, and lead ores, coal, iron, tin, zinc, copper, lead, clay and other minerals, to carry on the business of manufacturers of winding engines, motors, quarry and mine equipment, etc. Directors: G. H. Priestley, A. D. Hine, A. Wildgoose. Registered office: The Hill, Cromford, Derbyshire.

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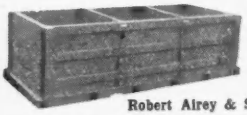

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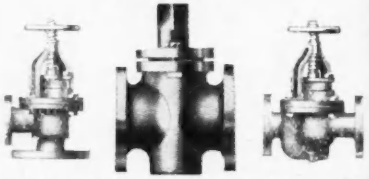

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